

Topic Overview

Reactions & Types of Reactions



KNOW IT

- I can state the signs of a [chemical change](#)
- I can compare a physical change and a chemical change
- I know what happens to atoms during a chemical change
- I know what happens to a fuel during [combustion](#)
- I know what happens when a substance reacts with [oxygen](#)
- I know what happens during [thermal decomposition](#)
- I know what [conservation of mass](#) means
- I know about [exothermic and endothermic reactions](#)
- I know why [catalysts](#) are used in industry



LINK IT

This topic links with the Elements you did in Year 7



PROVE IT

- DIRT task - Conservation of Mass
- End of unit test



SAY IT

VOCABULARY	DEFINITION
	Shows the amounts of all the individual atoms in a reaction
Electrostatic force	The force of attraction holding atoms together – positive attract negative
Chemical reaction	A process where a set of substances undergo a chemical change to form a different substance
combustion	The burning of a fuel in oxygen
	Maintained at a constant overall total
Law of conservation of mass	The total mass of reactants = the total mass of products
decomposition	Reactants are broken down
fuel	A substance that store energy as a chemical store
endothermic	A reaction that transfers energy from the surroundings
exothermic	A reaction that transfers energy to the surroundings
products	On the right side of a chemical equation. Made during a chemical reaction
reactants	On the left side of a chemical equation. Made during a chemical reaction
Thermal decomposition	A reaction where the reactants are broken down using heat

Chemical reactions

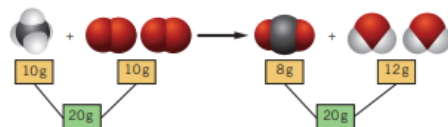
- Word equations can represent a **chemical reaction**:



- The **reactants** are on the left side of the arrow and the **products** are on the right side of the arrow
- We use an arrow instead of an equals sign as it represents that the reactants are changing into a new substance
- In a reaction, the amount of each type of atom stays the same, however they are rearranged to form a new product

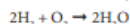
Conservation of mass

- In a reaction the mass will be **conserved**, this means that the total mass of the reactants will be equal to the total mass of the products
- If it appears that some of the mass has been lost, this means that a gas has been produced and escaped, accounting for the lost mass



Balanced symbol equations show the amounts of all of the individual atoms in a reaction

- The symbols used are from the Periodic Table
- They also show:
 - Formulae of reactants and products
 - How the atoms are rearranged
 - Relative amounts of reactants and products



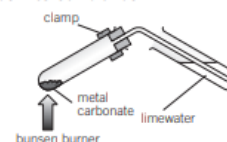
Combustion

- Combustion** is the burning of a **fuel** in oxygen
 - A fuel is a substance which stores energy in a chemical store
 - Examples of fuels include petrol, diesel, coal and hydrogen
 - When a carbon based fuel undergoes combustion, it will produce water and carbon dioxide
- methane + oxygen → carbon dioxide + water
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- Hydrogen can also be used as a fuel, this is much better than traditional fossil fuels as it does not produce carbon dioxide:
- hydrogen + oxygen → water

Thermal decomposition

- A **thermal decomposition** reaction is one where the reactants are broken down (decomposition) using heat (thermal energy)
- An example of this is with metal carbonates:

zinc carbonate → zinc oxide + carbon dioxide
- We can test for this carbon dioxide by bubbling the gas through limewater, if the limewater turns cloudy, the gas is carbon dioxide



Exothermic and endothermic reactions

Exothermic reactions involve a transfer of energy from the reactants to the surroundings

- As energy is transferred to the surroundings this will show an increase in temperature
- Examples of exothermic reactions include combustion, freezing, and condensing

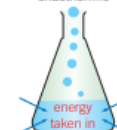
exothermic



Endothermic reactions involve a transfer of energy from the surroundings to the reactants

- As energy is taken into the reactants a decrease in temperature will be shown
- Examples of endothermic reactions include thermal decomposition, melting, and boiling

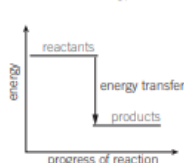
endothermic



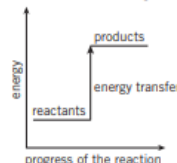
Energy level diagrams

Energy level diagrams show the values of energy between the reactants and the products in a reaction

- If the energy is greater in the reactants than the products then the reaction is exothermic as energy has been given out to the surroundings
- If the energy is lower in the reactants than the products then the reaction is endothermic as energy has been taken in from the surroundings



Exothermic



Endothermic

Bond energies

- Energy must be used to break **chemical bonds**, meaning that this reaction is endothermic
- Energy is given out when chemical bonds are made, meaning that this reaction is exothermic
- To see if a reaction is endothermic or exothermic, you must find the difference in the energy needed to break and to make the bonds in the reaction
- If the energy needed to break the bonds is less than the energy given out when making the bonds, the reaction is exothermic
- If the energy needed to break the bonds is more than the energy released when making the bonds, the reaction is endothermic



Key terms

Make sure you can write definitions for these key terms.

balanced symbol equation

chemical bond

chemical reaction

combustion

conserved

conservation of mass

decomposition

fuel

endothermic

energy level diagram

exothermic

products

reactants

thermal decomposition